

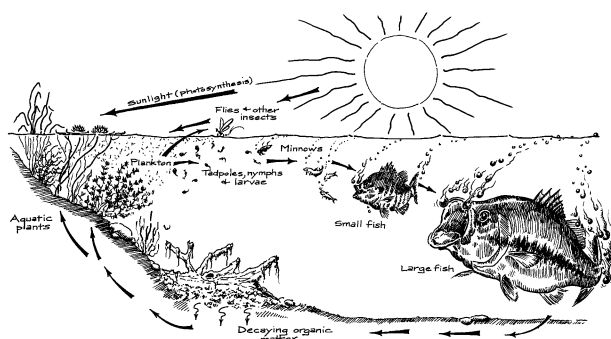
## THE CREEK CAFÉ

### OBJECTIVE:

Students will be able to identify producers and consumers found in a stream habitat community and to describe the energy flow in a simple food chain. Students will be able to identify how the plants and animals are interdependent on each other.

**GRADE LEVEL:** 4<sup>th</sup>-5<sup>th</sup> grade

**TIME:** 10-20 minutes



### MATERIALS:

- Stream habitat mat
- Rock(s)
- Plastic fish or photos of fish
- Plastic bird (Blue Heron) or photo
- Sun (use photo; or bright yellow umbrella; or wear a sun hat/sun on shirt)

#### Templates:

- Aquatic insect photo – 2 (tape to underside of rocks)
- Labels: Producer (2), Consumer (4), Decomposer (1-optional)
- Arrows – 4 or more

### BACKGROUND:

Oh what a tangled web we weave, when first we start to feed...

A simple **food chain** begins with the sun. Plants absorb sunlight and use this energy in the process of photosynthesis to create simple organic compounds otherwise known as carbohydrates (sugar). This form of “food” provides energy to the plant itself and to animals that eat the plant, creating a flow of energy through different stages referred to as trophic levels. Since plants produce their own food they form the base trophic level, and are named the primary producers. Animals in the next trophic level that eat the plants (herbivores) are described as primary consumers. In the next trophic level, predators that feed on the herbivores are identified as secondary consumers. These animals then become prey for the top predator in the food chain level called tertiary consumers. As one organism consumes another, the availability of energy across the trophic levels gradually dwindles from the beginning to the end of the food chain.

Like a spider’s web – **food webs** can become very complex. Food webs are made up of a network of food chains found within an ecosystem. For example, many species of plants and animals form multiple links within a food web of a stream or pond. This diversity includes primary producers (plants and algae), decomposers (bacteria and fungi), and primary, secondary and tertiary consumers (amphibians, birds, fish, invertebrates, mammals, and reptiles). Decomposers such as bacteria play a dual role, in that it promotes plant decay which provides food for the detritus feeders and releases nutrients back into the system for the plants to absorb.

While a food chain can be viewed as a simple one-way street for energy flow, from one level to the next, food webs become a maze of intricately woven strands of energy pathways flowing through the multiple predator – prey relationships for a diversity of species located in all of the trophic levels.

**Primary Consumers:**

Primary consumers feed on plants and assimilate the energy produced by the plants. Primary consumers in an aquatic ecosystem include small aquatic insects such as a mayfly. In a food chain, the primary consumers gain the most energy and provide the link in the food chain between the primary producers (plants) and the secondary consumers.

**Secondary Consumers:**

Secondary consumers are the next link in the food chain and feed on primary consumers. In some cases, some secondary consumers may also feed on plants. Like primary consumers, secondary feeders include many different types of wildlife. Cricket frogs are often heard and seen along creek and pond banks, and eat small insects including

mosquitoes. Small non-game fish such as Blackspotted topminnows feed on aquatic insects, algae, and other aquatic plants. Medium-sized fish like sunfish prefer to feed on worms, aquatic insects and smaller fish. In the mammal family, the Common Raccoon has a fondness for crayfish.

Birds such as the Great Blue Heron feed primarily on small fish, but will also eat amphibians, reptiles and small birds. The energy available to the secondary consumer is less than that of the primary consumer.



Blackspotted topminnow (*Fundulus olivaceus*)

**Tertiary Consumers:**

Tertiary consumers are considered to be the top of the food chain and typically do not have any natural predators. The diets of tertiary consumers may include animals from both the primary and secondary trophic levels. Like secondary consumers, their diet may also include some plants. Examples of tertiary consumers include a favorite of anglers, the Largemouth bass, which feeds on worms, crayfish, minnows and frogs. Another tertiary consumer to consider is the human being. Tertiary consumers gain the least amount of energy in the food chain.

**KEY TERMS:**

**Consumer:** Animals are called consumers because they need to eat other plants and animals to survive. [Note: primary consumers only eat plants; secondary and tertiary consumers eat plants or animals.]

**Decomposer:** an organism that converts dead organic materials into inorganic materials.

**Detritus:** dead and decaying plant and animal matter; organic matter.

**Ecosystem:** a natural unit that includes living and non-living parts interacting to produce a stable system in which the exchange of materials between the living and nonliving parts follows closed paths.

**Food Chain:** Food chains follow a single path as animals eat each other.

**Food Web:** Food webs show how plants and animals are interconnected by different paths.

**Producer:** a food maker--green plant that uses photosynthesis; producers need sunlight, water, and carbon dioxide to make their own food, it is the first level in the food chain. Example: aquatic plants and phytoplankton (microscopic algae).

### ACTIVITY PROCEDURE / SCRIPT:

Set up the mat on a table. Attach the sun to a lanyard or hat to wear. Place the rock with insects taped on bottom, fish, bird and other animals on the mat. Have labels and arrows ready to use (with tape on the backsides.)

Begin a discussion, using questions to interact with the students. If they do not answer right away, remember to allow at least ½ - 1 minute for students to answer.

**Who can give me a definition of a simple food chain?**

**Good answer!** (repeat what the student said). **A food chain is the flow of energy from one organism to another in an ecosystem.**

**What are the different groups found in a food chain?** [Producer, Consumer, Decomposer] If students give answers like omnivore, herbivore, predator and prey – gently remind them that these are a type of consumer. Keep probing for the right answers from the students. NOTE: Decomposer is not used in this activity.

**Can someone point to the “Producers” on this mat?** [Plants] Place producer label on the mat on the plants.

**Why are they called “Producers”?** [because they make their own food]

**What process do the producers use to make their own food?** [photosynthesis]

Pick up the rock with the macroinvertebrate and show the students. **Is this aquatic insect a producer or consumer?** [it's a consumer ~ for older students can elaborate and use the term “primary consumer”.] Place “primary” consumer label on the rock.

**Right, it's a (primary) consumer.**



Pick up a fish. **Is this fish a consumer or producer?** [it's a consumer ~ for older students use the term secondary consumer.] Place “secondary” label on the mat near the fish. **Right, it's a (secondary) consumer.**

**What about the bird?** [it's a consumer ~ for older students use the term tertiary consumer.] Place “tertiary” consumer label next to the bird. **Right, it's a (tertiary) consumer.**

**What about me as a human? Am I a producer or consumer?** [I'm a consumer too ~ for older students use the term tertiary consumer.]

**But I don't understand...I make my own food every night, cooking in the kitchen and I grow veggies in the garden – why am I not a producer?** [students should be able to explain that my body doesn't make the food—I don't use photosynthesis...] Place “tertiary” consumer label on yourself.

**So the bird in this stream, or the human, are at the top of the food chain. What is at the base of the food chain? Where does the food chain start?** [The Sun] place one arrow pointing from

sun to plants  →  as you explain and gesture **energy flows from the sun to the plants.**

**What does the aquatic insect eat?** [plants and detritus (dead material)]. Place one arrow pointing from plants to the insect. To test the students understanding, you can purposefully point the arrow in the wrong direction and ask the students if that's right?

**What does the fish eat?** [insect] **Which way does the arrow go?** [insects and plants] place one arrow pointing from an insect to a fish.

**What does the bird eat?** [fish] place one arrow pointing from fish to bird.

**Beginning with the sun, review step-by-step of the energy flow in the food chain. This is a simple food chain, a one-way street of energy flow.**

Pick up the producer label. **What happens if there were no producers?** [the food chain would collapse like dominoes, because the insect would not have anything to eat, then the fish would not have anything to eat....]. Replace the producer label.

**How is a food web different from a food chain?** Students should explain that food webs are more complicated or complex and made up of a bunch of food chains.

**A food chain can be viewed as a simple one-way street for energy flow, from one level to the next.** Review existing energy pathways on the mat from the simple food chain.

**Food webs are more complex and made up of several food chains.** Using one fish and more arrows explain and show the students what a small food web looks like. Place an arrow from the insect to the fish, from the frog to the fish, from the crayfish to the fish, and from the crayfish to the insect, etc....

(Optional). **How would a drought affect this ecosystem? How would a flood affect this ecosystem?**

#### **RESOURCES:**

- Wildlife Fact Sheets (TPWD), <http://www.tpwd.state.tx.us/huntwild/wild/species/>
- Texas Non-Game Freshwater Fishes, [http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd\\_bk\\_w7000\\_0798.pdf](http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_0798.pdf)
- Texas Freshwater Fishes online guide, <http://www.bio.txstate.edu/~tbonner/txfishes/>
- Learn About Texas Freshwater Fishes, [http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd\\_bk\\_k0700\\_0717.pdf](http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_k0700_0717.pdf)
- Frogs and Toads of Texas (TPWD), [http://www.tpwd.state.tx.us/learning/texas\\_nature\\_trackers/amphibian\\_watch/amphibian\\_species/](http://www.tpwd.state.tx.us/learning/texas_nature_trackers/amphibian_watch/amphibian_species/)

#### **TEKS:**

Grade 4:

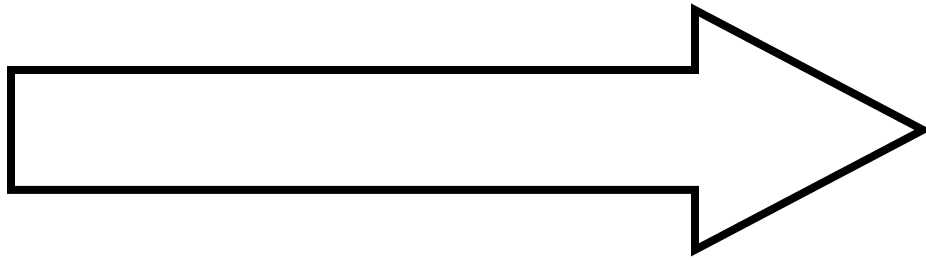
9) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:

- (A) investigate that most producers need sunlight, water, and carbon dioxide to make their own food, while consumers are dependent on other organisms for food; and
- (B) describe the flow of energy through food webs, beginning with the Sun, and predict how changes in the ecosystem affect the food web such as a fire in a forest.

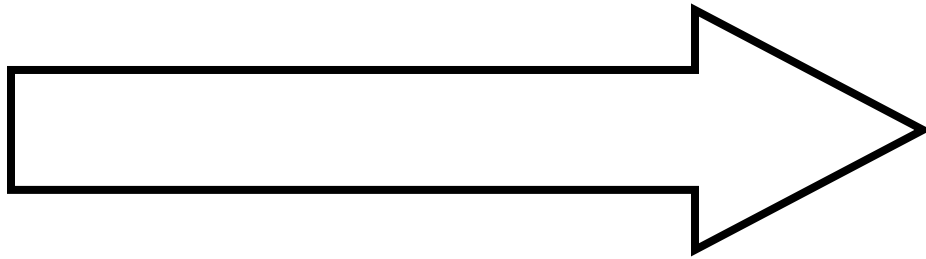
Grade 5:

(9) Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:

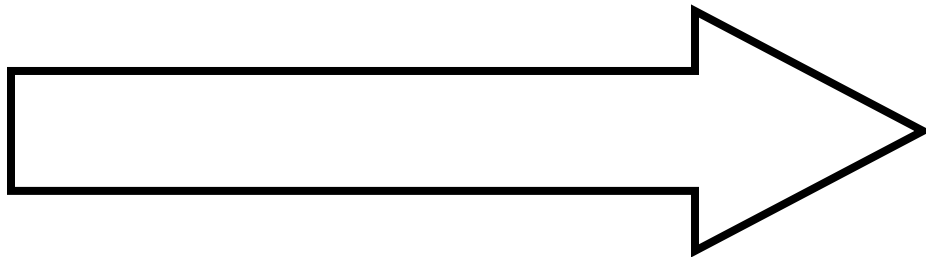
- (A) observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements;
- (B) describe how the flow of energy derived from the Sun, used by producers to create their own food, is transferred through a food chain and food web to consumers and decomposers;



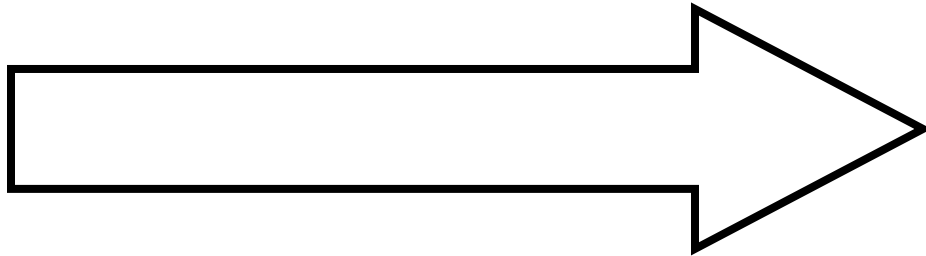
**PRODUCER**



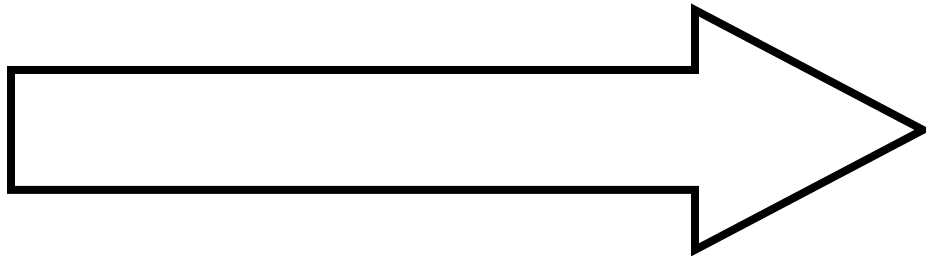
**CONSUMER**  
(primary)



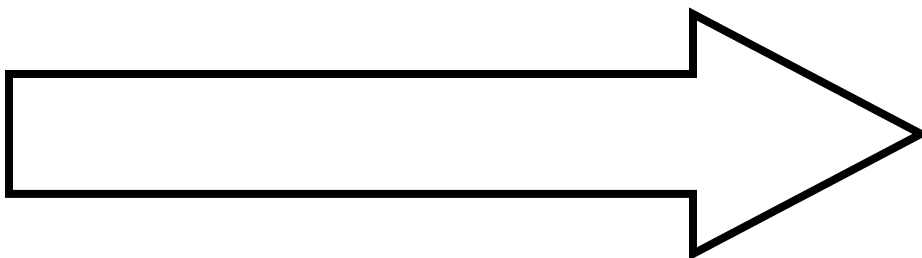
**CONSUMER**  
(secondary)

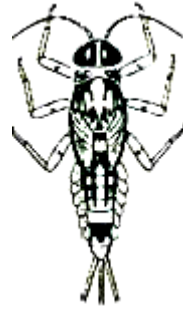


**CONSUMER**  
(tertiary)



**CONSUMER**  
(tertiary)





Mayfly nymph



Dragonfly nymph

